Coral microatolls on the fringing reefs of northwestern Simeuleu island emerged as much as 150 cm during the 2004 earthquake. The pattern of uplift constrains the southern terminus of the 2004 rupture to be under the northwestern part of the island. It also constrains the downdip limit of coseismic rupture to be between Simeuleu and the mainland coast of Aceh. Our reconnaissance of the Simeuleu's reefs in mid-January 2005 revealed that the northwestern third of the island tilted northeastward, toward the mainland coast of Aceh. Reefs nearest the mainland emerged about 25 cm, while reefs farthest from the mainland emerged about 150 cm. The magnitude of slip on the megathrust needed to produce these uplift values would be about 10 m if the megathrust dips 15°, or about 20 m if the megathrust dips 8° beneath the island. The magnitude of coseismic emergence diminished southeastward to zero about midway down the island's long axis. The pattern and magnitude of emergence and tilt are similar to what occurred on the Mentawai islands farther south during the giant earthquake of 1833. The corals also reveal that uplift of up to 15 cm occurred just a couple years ago, near the terminus of the 2004 rupture. This probably reflects slip on the megathrust during the M 7.5 earthquake of 2002.